

L2(5.2) - Translations of a Quadratic Relation

1. factored form: $y = a(x - s)(x - t)$

2. standard form: $y = ax^2 + bx + c$

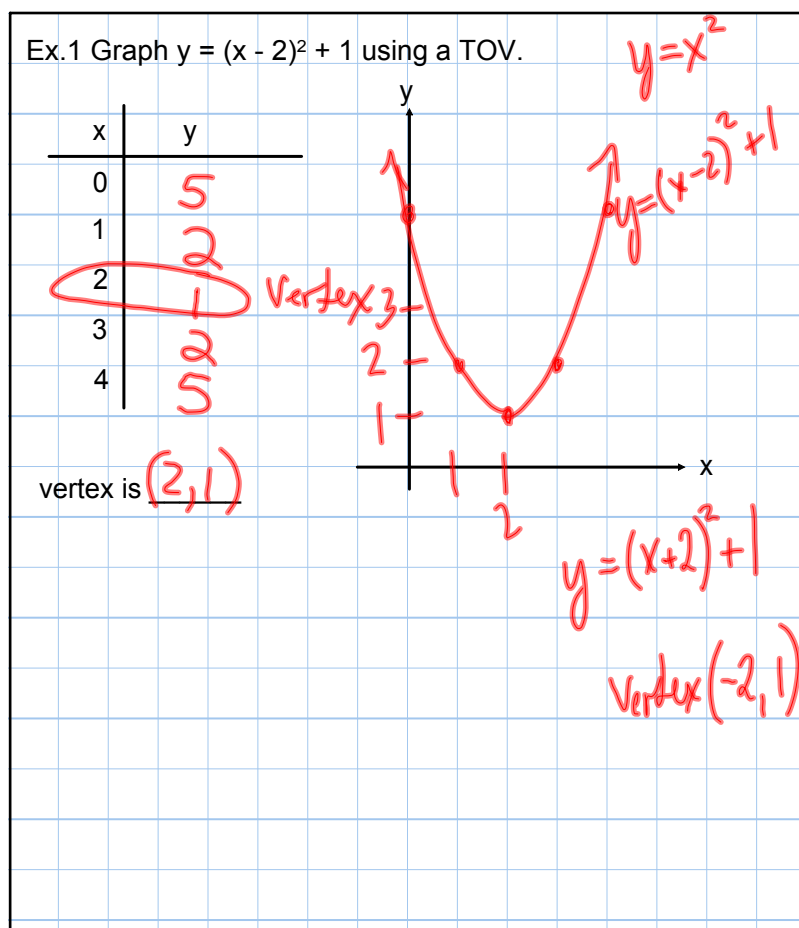
3. vertex form: $y = a(x - h)^2 + k$

a tells us the **direction of opening** (up or down),
and any **vertical scaling** (stretch or compression)

h is the **x-coordinate** of the vertex.

k is the **y-coordinate** of the vertex.

Mar 20 - 4:17 PM



Apr 14-7:45 PM

The vertex of the parent function, $y = x^2$, is (0, 0).

If the vertex has moved from (0, 0) to (h, k) then the graph has been

translated vertically by k units (up or down)

and horizontally by h units (left or right)

Vertex Form: $y = a(x - h)^2 + k$

What about the signs of h and k?



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Ex.2 State the coordinates of the vertex and direction of opening.

- (a) $y = (x - 5)^2 + 4$ Vertex (5, 4) Opens Up
- (b) $y = (x + 3)^2 + 11$ Vertex (-3, 11) Opens Up
- (c) $y = -2(x - 6)^2 - 8$ Vertex (6, -8) Opens Down.
- (d) $y = \frac{3}{4}(x + 13)^2 - 2$ Vertex (-13, -2) Opens Up
- (e) $y = -(x - 4)^2 + 5$ Vertex (4, 5) Opens Down

Apr 27-8:34 PM

See Geogebra quadratic translation demo
(click here for link)

Nov 10-8:19 AM

Ex. 3. Identify the transformations (in the correct order), the vertex, axis of symmetry, and the direction of opening.

a) $y = (x - 2)^2 - 3$

① horizontal
shift to the
right by 2

② vertical shift
down by 3

Vertex $(2, -3)$
A.O.S. = 2
Direction
of
opening = Up

A.O.S.
optimal value

Nov 10-8:38 AM

b) $y = 2(x + 4)^2$

Vertex $(-4, 0)$ axis of sym = -4

Direction = Up

① Vertical stretch by
a factor of 2② horizontal shift
left by 4

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c) $y = -0.5x^2 + 4$

$$= -0.5(x + 0)^2 + 4$$

Vertex $(0, 4)$

A.O.S = 0

 $x = 0$

Direction = Down

① vertical reflection
in the x -axis② vertical compression
by a factor of 0.5

③ Vertical shift up by 4

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Assigned Work:

p. 262 # 1, 2, 3abe, 4, 5

Nov 10-8:41 AM